E1-05 I-V characteristics of ITO/Cu_2O/metal junctions

L D R D Perera[1], W Siripala[1], S R D Kalingamudali[1], J K D S Jayanetti[2], K T L de Silva[2]
([1]*Dept. of Physics, Univ. of Kelaniya,* [2]*Dept. of Physics,Univ. of Colombo, Colombo 3*)

Cuprous oxide is an inexpensive and non-toxic semiconductor material having the potential for use in low-cost photovoltaic devices. Electrodeposition is a low-cost method to produce thin Cu_2O films and electrodeposited Cu_2O has been reported to be n-type. In order to investigate the possibility of using electrodeposited Cu_2O in solar cells, Cu_2O/metal junctions were studied using their I-V characteristics.

Thin films of Cu_2O were electrodeposited on Indium tin oxide (ITO) coated glass substrate using an aqueous solution of cupric acetate. Electrodeposition was carried out under potentiostatic condition of -250 mV vs SCE at 55°C for a period of 1 h. These Cu_2O samples were used to make junctions with Al, Hg, Cu, Ag and Au. The I-V plots of these junctions were obtained in dark and when illuminated.

The I-V characteristics of the Cu_2O/Hg junction show good rectifying properties. The plots for the junction in dark and under illumination indicate that the electrodeposited Cu_2O behaves as an n-type semiconductor. The I-V profile fits into the standard diode equation with $I_0 = 2.8 \times 10^{-10}$ A, ideality factor n=0.48 and series resistance $R_s = 40\dot{U}$. Also, the junction exhibits a contact potential of about 150 mV.

Financial assistance by NARESA (Research grant RG/94/P/03) is acknowledged.